CALIFORNIA EROSION DIGEST

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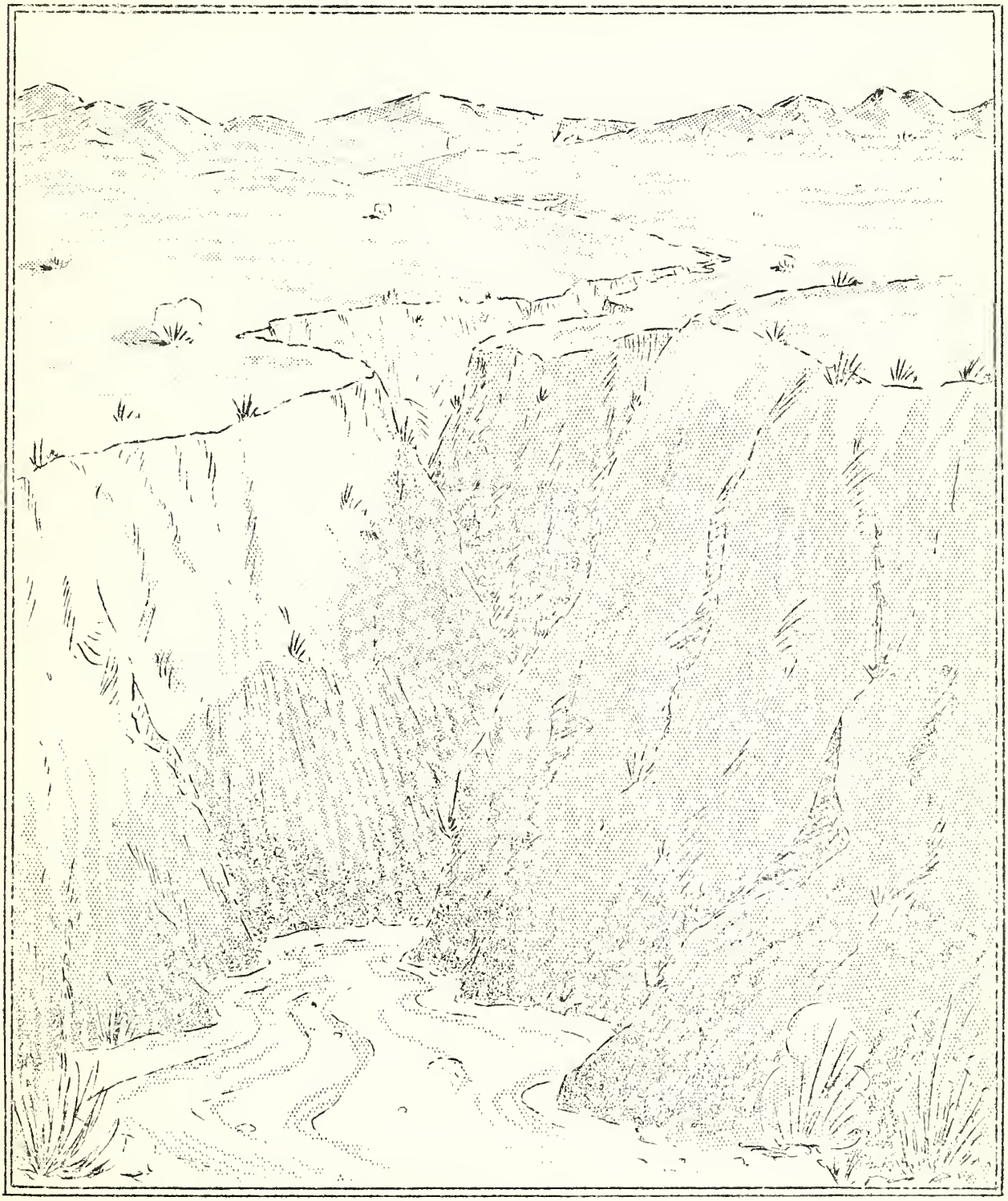

SOIL CONSERVATION SERVICE
U. S. DEPARTMENT OF AGRICULTURE

or "on the contour" and never up and down the slope. As the trees grow older continuous contour cultivation will gradually form a terrace along each row. As this terrace gradually flattens it eventually takes the position of occupying approximately three-quarters of the downhill portion of the entire space devoted to the row, which in the case of a thirty-two foot row would be twenty-four feet. The upper one-quarter of the row or eight feet of the thirty-two foot row usually called the "riser", gradually becomes steeper as the terrace flattens. This riser is never cultivated but left as a vegetated strip along each row. The vegetation holds the soil in place on the steeper slope of the riser by the binding action of roots and by absorbing the beating force of the raindrops and at the same time increases the perviousness of the soil giving a greater depth to the penetration of the water. The increase in penetration, which is really conservation of water, should more than offset the transpiration loss from the vegetation. After the rainy season the vegetation should be mowed or scythed and the litter left on the ground.

The terrace thus formed in each row being laid on the proper grade for drainage diverts the water down the row at a velocity or rate of flow much slower than it originally attained when it flowed directly down the slope. This retarded rate of flow obviously materially increases the quantity of water penetrating into the soil. Retardation and permeability of the soil is further increased by a good, heavy cover crop.

From the above it can readily be seen that this system of planting is the only practical and permanent method of completely preventing or satisfactorily reducing soil losses on hillside orchards, provided suitable drainage ways are built at the points of concentration, and at the same time materially increasing the amount of moisture made available to the trees. Ease of cultivation, hauling, etc., are other factors in favor of contour planting as these are all done on a uniform slope which is so nearly level that the most economical use of power is secured.

The old orchards which are square or "diamond" or hexagonal planted, may be protected by the use of either permanent or annual ditches. These ditches are constructed in the orchard at intervals of from fifty to seventy feet, depending on the slope of the ground and the soil type. Steep slopes on light sandy soils require steeper grades in order that water heavily laden with silt will have sufficient velocity to maintain its silt load and keep the ditch clean. Ditches should have a uniform slope throughout, regardless of what grade is used. Non-uniform grades result in variable velocities or speeds of running water. The steeper portions of the ditch will be scoured or washed by the cutting action of the water having the greater velocity, while the flatter portions of the ditch will be silted or filled up by the deposition resulting from the slower velocity being unable to carry its full load of silt.

Both types of ditches are laid out in the same manner. After the spacing and the grade to be used is established, the center of the ditch is marked with stakes at intervals of twenty-five or fifty feet as conditions require. The tree above and below the ditch is then marked by painting a two or three inch stripe around the trunk. Alternate colors are used in painting so as to better distinguish and easily follow a ditch. Red, white and yellow has been found to be a good combination. A good quality paint having a small amount of varnish or enamel should be used. Paint manufacturers furnish a "contour paint" which is

especially adaptable for this work as the chemicals used in spraying react rather rapidly to destroy ordinary paint.

The annual type ditch is thus permanently marked and the farmer may plow his ditches in the proper location each fall without further assistance. Some hand work in finishing the ditch should follow the plowing, and the outlets should be properly connected. Cover cropping, in addition to annual ditches, should give satisfactory protection to the orchard and conserves considerable moisture. This type of protection is applicable to land having a comparatively heavy soil, such as silt loams or clay loams.

Permanent ditches are quite similar to annual ditches and in addition are protected by a vegetative cover, usually a close growing grass or sod. This vegetation not only protects the surface from erosion, but binds the soil together with roots. A strip of grass ranging from eight to fifteen feet wide is also planted parallel with and immediately above the ditch. This strip will filter or sift the sand and silt from the water approaching the ditch resulting in comparatively clean water in the ditch and at the same time keep the soil in its place on the slope. These strips should be maintained in the same manner as explained before in describing the vegetated riser in a contour orchard, i.e. mowed but never plowed or disced.

This type of protection, while consuming some moisture, will induce contour cultivation in the orchard which in itself should conserve more than enough moisture to support the vegetation required. When combined with a good heavy cover crop during the winter months such control should effectively protect the most erosive soils and afford an opportunity to rebuild the more depleted soils by fertilization and turning under the cover crop in the spring.

All of these control measures are demonstrated at the Corralitos Project and a great deal of interest is shown by the farmers in the area. The soil is generally very erosive and every storm produces rills and small gullies in nearly every tree row resulting in tremendous soil losses. It is hoped that every farmer will recognize this menace to his livelihood and take the necessary precautions to prevent any further loss which decrease the productiveness of his land.

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A First Course in Soil Erosion

In response to an increasing demand for instruction in soil erosion control, one of the first college courses treating the subject as an entity was offered at Oregon State College during the 1934-35 winter term. This course consisted of some 14 lectures, recitations, and a dozen laboratory periods of 3 or 4 hours duration each. Over 200 recent references on erosion were supplied covering the various topics discussed. - - - The Land, Today and Tomorrow. Vol. 2, No. 4.

Vegetative Control on The
Las Posas Project

A progress report of the Agronomy Division of the Soil Conservation Service in the Las Posas Area since the date actual control planting began (June 1934) to May 1, 1935 shows a total of 1964.4 acres on which vegetative control work was initiated and carried on by this division. A distribution of this figure with segregations according to the phase of vegetative control is shown in Table I.

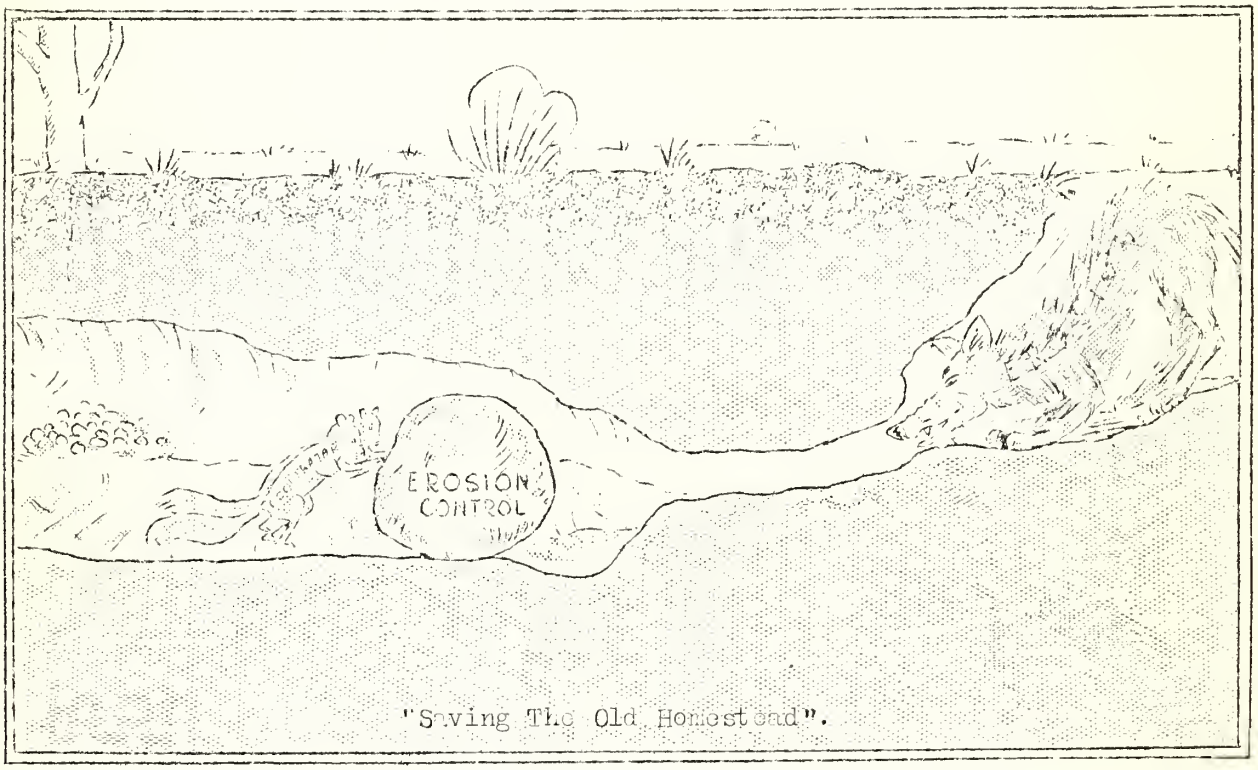
TABLE 1

Types of vegetative control and area planted
Las Posas Project, June 1, 1934 to May 1, 1935

Type	Area Planted (Acres)
Forestation	924.0
Strip cropping	365.0
Terrace outlets	1.4
Gully control	674.0
Total	1964.4

The figure for gully control is inclusive of seeding and planting around engineering control structures such as pipe and wire check dams, masonry and concrete check dams of various types and sizes and outfall structures (diversion ditch outlets) for general protection of these structures as well as planting of gully and barranca proper for bank and channel control.

The more important kinds of trees, seeds and shrubs used in forestation, strip cropping, terrace outlets and gully control on the areas referred to in Table 1 are listed on the next page.



"Saving The Old Homestead".

Plantings of Trees, Seeds and Shrubs
Las Posas Project, June 1, 1934
To May 1, 1935.*

Kind	Trees	Quantity
		Number
Arizona Ash		10,000
Arizona Cypress		2,475
Black Locust		9,150
Chinese Elm		270
Elm Species		9,800
Eucalyptus		72,119
Madrono		541
Oak		13,968
Pine		5,000
Southern California Black Walnut		5,378
Willow		176,559
	Seeds	Pounds
Acorns (Oak)		494
Alfileria		211
Barley		133
Black Walnut		1,440
Burnett		130
Cane Grass (Elymus condensatus)		766
Clover-Bitter (Melilotus indica)		1,819
Clover-Bur		1,337
Clover-Yellow Sweet (Melilotus officinalis)		1,398
Clover-White Sweet (Melilotus alba)		2,253
Elderberry		331
Fennugreek		105
Laurel (Sumac)		213
Lespedeza		407
Millet-Hog		4,987
Mustard-Trieste		576
Needle Grass (Stipa sp.)		190
Oats-California Red		13,170
Salt Bush - Australian		173
Sudan Grass		4,972
Vetch - Purple		911
	Shrubs	Number
Coyote Brush		4,000
Elderberry - Blue		633
Holly		6,838
Laurel (Sumac)		1,604
Lemonade Berry		300

*The above list is not inclusive of the total plantings but represents the more important kinds used in vegetative control work.

Erosion Notes From Orange and Santa Cruz Counties

"The recent dust storms of the central states have temporarily detracted attention from the soil losses experienced here at home, says Farm Advisor Harold E. Wahlberg. Although favored in many ways, California and Orange county are by no means exempt from the toll exacted each year by flash storms which cause both sheet erosion on the gentler sloping fields and heavy cutting on the steep slopes.

Man operates first as an agent of denudation, that is, of removal of successive layers of the soil, by baring the surface and by compacting the soil. Of these, the former act is enormously the more significant. By destroying the cover of vegetation and by cultivation, absorption is greatly reduced and run-off is increased, and in other cases the wind is given a chance to blow away the surface soil.

Demonstration Projects

The spread of civilization in all parts of the country has been accompanied by a gutting and wasting of land without equivalent in history. This land problem includes erosion, which will grow increasingly serious in some areas unless checked, says the Farm Advisor. In the Santa Paula region the Soil Conservation Service has undertaken a major erosion control operation for this state. The area will serve as a demonstrational base for that part of the state. A similar demonstration project is being sought by local property owners for Orange county.

Cultivation, as has been the case in other states, will be forced away from numerous areas of steeper slopes in California in the near future. Although hills and slopes have shown marked resistance to erosion, the effects of hillside cultivation and grazing are becoming apparent over larger and larger areas . . . . ." Orange Daily News, Orange, May 31, 1935.

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RECENT ADDITIONS TO CORRALITOS COOPERATORS
SANTA CRUZ COUNTY

Clarence E. Patty
James A. Gray
Lester H. and Belle Smith
Claud C. and Agnes Hammitt
C.H. and P.S. Baker
Mary K. Forrester
Samuel Charlson
Lloyd E. Charlson
Walter E. Vass
Herbert H. and Grace S. Kenyon
Henry Rhodes
Wm. M. Holloway
Irving C. and Edna S. Dake
Leroy B. and Jessie B. Jarrett
Clara I. Dake and Lillian J. Heath
Irving C. Dake
Burton S. and Grace G. Hitchings
Owen C. and Edgar P. Hamilton
Amon L. and Gertrude Cottrell
Allen Dewart

EROSION CONTROL RETARDS RUNOFF - SAVES WATER

Edward W. Stevenot, Junior Agricultural Engineer

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An excellent indication of the efficiency of erosion control work is retardation of runoff. Since the work in the Las Posas Area began, careful measurements of the intensity, duration, and frequency of rainfall and the speed and volume of runoff have been made. Unfortunately no exact data of this nature were compiled previous to the start of the work; so any comparisons between former and present conditions can be only approximate.

One drainage area in the Las Posas which is suitable for such comparisons lies between the Fox and Honda Barrancas above Los Angeles Avenue. This watershed formerly comprised 446 acres with a variety of soil types, slopes varying from 0 to 25%, and all degrees of erosion. Stabilizing dams and vegetation have been placed in the gullies, and terraces, hole-digging, contour ditches, and strip crops have been used in controlling sheet erosion. In the course of this work the original area of the watershed was reduced by 16 acres or 3.8% due to draining terraced land into a more feasible outlet channel.

Prior to 1928 the watershed drained by way of Aggen Road, which was unpaved and served as a ditch. In December of that year a trapezoidal ditch 25' wide at the top and 3'6" deep was completed parallel to the road to carry the water. That this ditch was of insufficient capacity before erosion control work was done was indicated by statements from a number of ranchers. It repeatedly overflowed into Aggen Road. At such times the peak flow was reached shortly after a heavy downpour, quickly subsided, and the water ceased flowing in a few hours.

Erosion control work on the watershed was completed in 1934, and on January 5, 1935 there occurred a rain which ranchers in the area agreed should have produced the greatest runoff on uncontrolled fields, of any rain since 1927. Although there had been greater daily precipitations during this period, as indicated by the rainfall records, the fact that this rain fell on saturated soil and reached a maximum intensity of 2.06" per hour (for 14 minutes) supports the testimony of the ranchers. On this day the runoff from the controlled watershed not only did not overflow the ditch, as it had done following lesser rains in previous years, before erosion control work was begun, but the peak flow was only 34% of the capacity of the ditch, which, according to the results of a recent survey, is practically the same now as when it was completed. This reduction of peak flow is much too large to be attributed entirely to the 3.8% decrease in the size of the watershed. Furthermore, instead of the water ceasing to flow a few hours after the peak had passed, it continued to run for 24 hours.

This great decrease in the peak flow and the lengthened period during which water continued to drain from the area, indicate roughly but conclusively that the erosion control measures retarded runoff, and consequently increased percolation.

EROSION FLOAT WINS FIRST PRIZE IN SPECIAL AWARDS AND SILVER CUP AT PARADE OF FIESTA DE LAS FLORES, SAN LUIS OBISPO

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The SCS-ECW float on erosion and its control which was in the parade of the Fiesta de Las Flores at San Luis Obispo June 1, won a silver cup and garnered first prize in the special awards.

A. E. Weidman, ECW clerk, and C.B. Ahlson, Chief Agronomist for the SCS designed the float. Weidman was also in charge of its construction.

Applause and cheers greeted the float along the entire line of march. The parade was four and one-half miles long, two hours being required to pass the judges' stand on the courthouse lawn. Movie sequences and stills of the float were taken by A. H. Vallet, ECW photographer. It was the only float to be exhibited in the roped-off area in front of the old Mission.

Upon its return to Santa Paula it was placed in front of the Government garage for one day. The Santa Paula Chronicle, for Tuesday, June 4, said: "Hundreds of interested spectators viewed the prize winning SCS float in front of the organization garage on Mill Street today. The float, a model of a section of South Mountain, won a silver cup and other honors in the Fiesta parade at San Luis Obispo last week. It portrays orchards and ranch lands which have been neglected as compared to those which have been guarded against soil erosion."

After being enlarged by the addition of valley lands to the miniature mountains and foothills the exhibit was placed on display at the University of Southern California during the meeting of the Institute of Government June 10-14 where it attracted a great deal of attention. On the fifteenth it was put on display at the Dean Hobbs Blanchard Library in Santa Paula. - Walter A. Lloyd.

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OBJECT LESSON IN HOW NOT TO USE THE SOIL

(See: Field back of Ventura County Hospital)

"Before the World War this Ventura County slope produced lima beans. In 1915 the author designed a system of terraces to protect it from erosion, which had then just started, but the terraces were not constructed. The field is now so badly gullied that it can no longer be used for any purpose" - "Soil Erosion in California: Its Prevention and Control" - by Walter W. Weir, Associate Drainage Engineer, University of California.

LECTURES ON SOIL CONSERVATION ARE A PART OF THE TRAINEE COURSE

Harry E. Reddick, Regional Director, opened the series of lectures on soil conservation with a general introductory talk on June 11. After relating the history of the SCS and its probable future development, Mr. Reddick stressed the importance of erosion control. Erosion is a vital problem that requires urgent attention if the future agricultural stability of the state and of the nation is to be preserved.

The erosion which the SCS is combating is that induced by cultivation practices; farming areas which should never have been taken from native vegetation and clean cultivating slopes in such a manner as to increase the velocity of runoff. Geologic erosion, which is the type heretofore usually called to mind when "erosion" is mentioned, is the natural and unpreventable leveling of slopes which occurs over thousands of years under even the most favorable vegetative conditions. This type of erosion is so slow that the processes of soil formation keep up with it, and although slopes are gradually leveled they are always covered with soil. Man-induced erosion, on the other hand, is so rapid that the soil is removed many times faster than it can be formed. It is to change the agricultural practices, to slow down this type of erosion to the point at which soil formation can keep up with it that the SCS is striving.

In closing Mr. Reddick pointed out that the SCS projects now under way are demonstrations. In other parts of the country conditions are similar over wide areas, and one project will serve as an example for a large region. In California, however, conditions vary so much over short distances that the zone of influence of a demonstration area rarely extends beyond a single county. For this reason it is necessary in this state to have many small demonstrations rather than a few large ones.

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The second in a series of lectures for Soil Conservation Service trainees was given the evening of the twelfth by Dr. Stanley W. Cosby, Chief Soil Expert. His subject was "Soils and Their Relation to Erosion". The first part of the talk was devoted to the question: "What Are Soils?"

Soils are distinctive, dynamic, definite, natural entities which can be classified as plants and animals can be classified, and which go through a definite life cycle from embryonic development to old age. The raw material from which soils are made is decomposed rock. Through the action of air, water, temperature changes and living things, the raw material is changed in its chemical and physical properties, and material is removed from the top soil and deposited in the lower layers. The differenciation of layers goes on until the soil reaches old age when the top soil has lost most of its fertility and the lower layer has become again rock-like. At this point the top soil, having little vegetation on it, is subject to geological erosion, and a new generation of soil begins to be formed from the lower layers. As such a life cycle is measured in thousands of years, many factors may intervene and stop the cycle at some stage, or a new cycle may be started before the old one is finished.

In addition to stage of development, soils vary as to their texture or size of particles; their structure, the arrangement of these particles; their

chemical composition, and their fertility. All these must be considered in classifying the soils and in determining what can be grown on them.

Soils vary in their capacity to absorb water, and what water cannot be absorbed must run off. The amount of runoff will depend upon the amount and character of rainfall and the absorptive capacity of the soil. The speed of runoff will depend upon the slope and the type and amount of vegetation. Balanced against these factors which influence runoff is an inherent quality of the soil, erosivity. This is the tendency of a soil to erode under the influence of a given amount and velocity of runoff and varies with each soil type. Runoff and erosivity determine the amount of erosion.

Dr. Cosby pointed out that the soils department is essentially a service department as, in addition to the regular surveys that it makes and the interpretations of the findings, the department makes special investigations of individual problems for the engineers and agronomists.

In conclusion he stressed the fact that the coordinated use of all methods of control is the unique justification for the establishment and existance of the Soil Conservation Service. Only by the complete cooperation of all departments can such work be carried to a successful conclusion.

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NOTICE TO COOPERATORS

Laborers and temporary employees of the Soil Conservation Service were released from employment Thursday, June 20, awaiting allocation of the new Works-Relief Funds to the various projects.

The present administrative and technical supervisory staff is being retained to complete plans and to provide direction for the large number of unemployed which will be used for work on the expanded program of Works-Relief projects as soon as funds are made available. A skelcton organization is being maintained to care for equipment, maintain plantings, and other phases of the work which would suffer from neglect.

The temporary lay-off of employees is nation-wide and caused by the shortage of general organization funds. The program will again be expanded as soon as the new Works-Relief Funds are available, subject, of course, to conditions under which those funds may be spent. - - Harry E. Reddick, Regional Director.

NEW E.C.W. CAMPS FOR S.C.S.

State and county allocations of 505 Civilian Conservation Corps camps assigned to the Soil Conservation Service throughout the country have been made. Of these fifty-five are old camps operated heretofore by the Service itself, 150 are old camps formerly operated by the Forest Service but recently transferred to the S.C.S. and 300 new camps created under the expanded C.C.C. program.

In addition to the three S.C.S.-C.C.C. camps which are now working on soil conservation projects in California, two at Las Posas and one at Arroyo Grande, there are to be nine new camps.

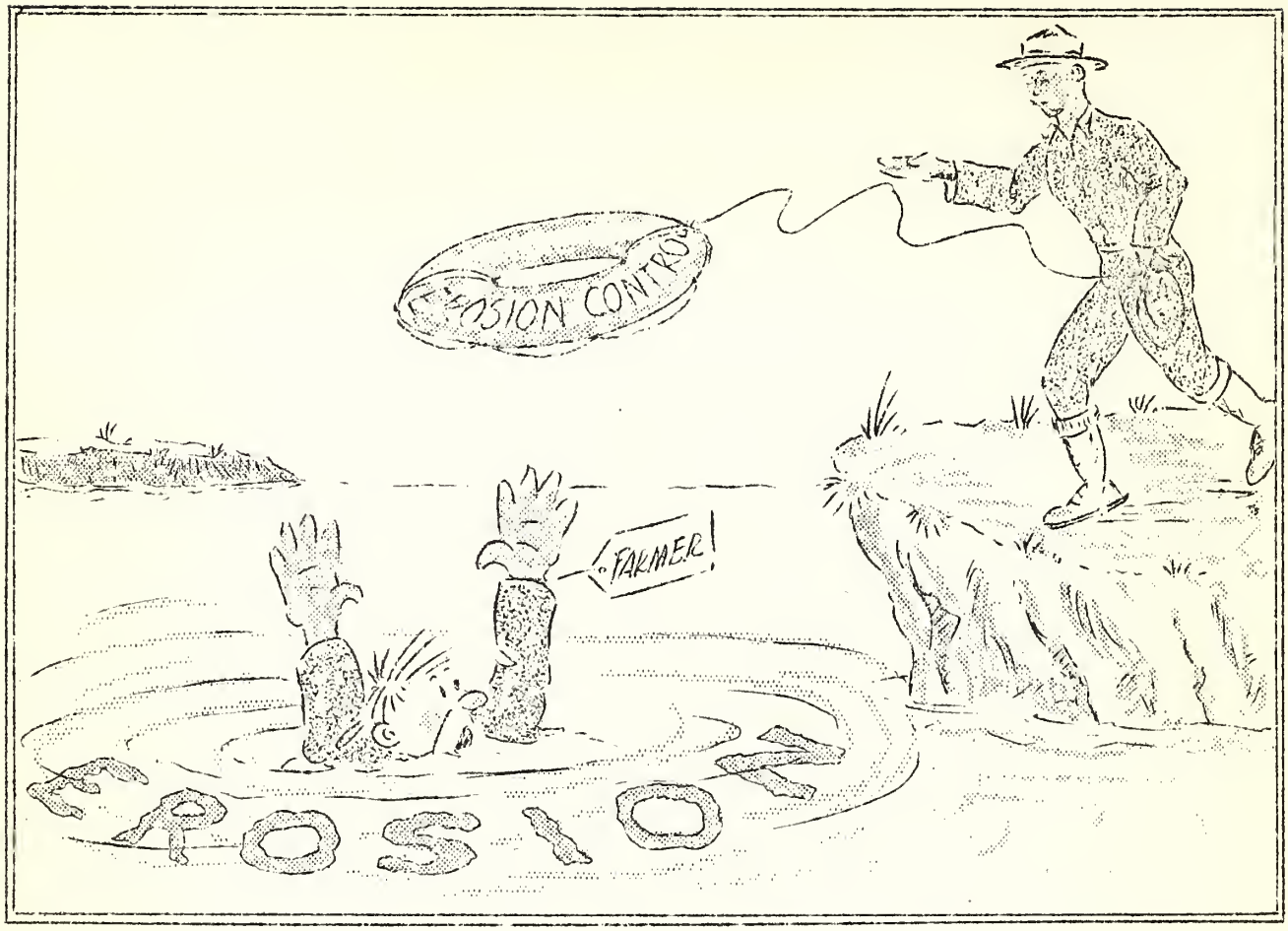
The location of these camps was made by the Army on the recommendations of Arthur Burns, State Administrator, Carl Gragg and Horace R. McConnell, Assistant State Administrators of the E.C.W., and George W. Gosline, Assistant Agricultural Engineer of the S.C.S. The camps are now being built by advance cadres of Army and C.C.C. men with the aid of some civilian skilled labor. It is expected that all the camps will be occupied by the middle of July and will begin soil conservation work at once.

The number, name, and location of the new camps are as follows:

S.C.S. Cal. 4	Sebastopol	Sebastopol, Sonoma County
S.C.S. Cal. 5	Camp Chester	Vacaville, Solano County
S.C.S. Cal. 7	Aptos	Aptos, Santa Cruz County
S.C.S. Cal. 8	Pinto Lake	Watsonville, Santa Cruz County
S.C.S. Cal. 9	Lompoc	Lompoc, Santa Barbara County
S.C.S. Cal. 10	Cucamonga	Upland, San Bernardino County
S.C.S. Cal. 11	Vista	Vista, San Diego County
S.C.S. Cal. 12	El Toro	El Toro, Orange County
S.C.S. Cal. 13	Palos Verdes	San Pedro, Los Angeles County

The three camps which have been doing soil conservation work are the following:

S.C.S. Cal. 1	Moorpark	Moorpark, Ventura County
S.C.S. Cal. 2	Arroyo Grande	Arroyo Grande, San Luis Obispo
S.C.S. Cal. 3	Somis	Somis, Ventura County



SEE EROSION EXHIBIT AT SAN DIEGO FAIR

A statue of an imaginative city boy, CCC enrollee in one of the Soil Conservation Service camps, gazing in awe at a handful of soil, is the first object to attract the attention of visitors to the ECW exhibit on soil erosion control at the California Pacific International Exposition at San Diego.

A series of tableaus show the development of the boy from the time he is worrying about his next meal until he finally emerges as a care-free, hard working member of the Civilian Conservation Corps, and at the same time show the development of the land from its eroded and low productive condition until it has been converted by the efforts of the CCC enrollees into erosion controlled, highly productive fields. Bringing together the boy and the land for the benefit of both is the point which these tableaus bring home.

Directly below the tableaus are replicas of eroded farm lands typical of seven sections of the country. On these are miniature Nebraska silos, southern cabins, California ranches, figures of CCC boys controlling gullies, and hundreds of other details that lend a realistic touch to the landscapes. These models are designed to show the variety of work which the CCC boys are doing in controlling erosion.

The exhibit was prepared by Charles D. Jarrett, under the supervision of Harry E. Reddick.